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(54) CONTROL STABILITY SYSTEM FOR MOIST AIR DEHUMIDIFICATION UNITS AND METHOD OF OPERATION

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(57) **ABSTRACT**

A system and humidity control method is provided for a multi-stage cooling system having two or more refrigerant circuits that balances humidity control and cooling demand. Each refrigerant circuit includes a compressor, a condenser and an evaporator. A hot gas reheat circuit having a hot gas reheat coil is connected to one of the refrigerant circuits and is placed in fluid communication with the output airflow from the evaporator of that refrigerant circuit to provide additional dehumidification to the air when humidity control is requested. The hot gas reheat circuit bypasses the condenser of the refrigerant circuit during humidity control. Humidity control is performed during cooling operations and ventilation operations. During a first stage cooling operation using only one refrigerant circuit and having a low cooling demand, the request for humidity control activates the hot gas reheat circuit for dehumidification and activates a second refrigerant circuit to provide cooling capacity. The hot gas reheat circuit is sized to match the cooling provided by the evaporator so that air cooled by passing through the evaporator can be reheated. Excess refrigerant is passed into the inactive cooling circuit so that proper pressure and temperature can be maintained in the active reheat circuit and os that high head pressure that can damage the compressor can be avoided. During a second stage cooling operation using two or more refrigerant circuit and having a high cooling demand, the request for humidity control is suspended and is initiated only upon the completion of the second stage cooling demand.